

SECTION 10 - AGENCY CONVENTIONS, INTERCHANGE CONTROL & TRANSACTION SETS

10.1 Introduction

The conventions for Electronic Data Interchange communications with the U.S. Environmental Protection Agency (EPA) using ANSI ASC X12 formats are documented in this section. This publication provides only a generic description of the information necessary for communications. The detailed conventions for a specific project are documented in the Agency's Implementation Guideline Conventions used by that project.

Section 10 contains the descriptions of the information used in the Interchange Header (ISA), Interchange Trailer (IEA), Group Start (GS), Group End (GE), and the control segments. An example of a typical transaction set will also be described, listing the transaction set as it appears in the standards manual with the segments that are to be used shown shaded. This is followed by the details of each segment shown on individual pages that detail the data elements, including codes or qualifiers that are required.

To help understand how the standards work, it is useful to begin by defining some terminology and explaining some of the components that make electronic communications possible. It is important to note that in the transaction set implementation guidelines all text shown in *italics* is an EPA Convention. Non-italicized text contain definitions and comments directly from the X12 standards.

A "*transaction set*" is the term used in business data interchange to describe the electronic transmission of a single document (purchase order, Discharge Monitoring Report, shipping notice, etc.) between one organization's computer and the computer of the other trading partner. The data included in a transaction set conveys the same information as a conventional printed document.

A *transaction set* generally but not always, consists of three areas - Header or Table 1, Detail or Table 2, and a Summary or Table 3. The *Header Area* contains information that is of an administrative nature and pertains to the entire document (document dates, identities, names of contacts, etc.). The *Detail Area* is used to convey the actual business transaction such as quantities, prices, items. Data in the Detail Area overrides equivalent Header Area data (i.e. if a contact is specified in the Header and another contact is specified with a single item, the second contact takes priority). The *Summary Area* contains control information and may contain other data that relates to the entire transaction.

Transaction sets are a collection of a series of segments. A *segment* is a group of data used to convey a logical grouping of data. The data within a segment is contained within data elements. A segment is the smallest discrete piece of data in the ASC X12 design.

Please note that in the design of Composite Data Elements, sub-elements are still referred to as elements.

EDI transmissions are created from information extracted from internal information systems, translated into ASC X12 format and punctuated with control characters. Quantity, unit of measure, unit price, catalogue number is typical purchase order or invoice information. In an invoice transaction the information becomes a segment if five data elements grouped in a specific sequence as follows:

IT1Quantity*Unit of Measure Code*Unit Price** Product
Service Qualifier*Product/Service Identification N/L**

The ASC X12 format requires each element be separated by an element separator and the last element be followed by a segment terminator. Graphic representations of the control characters usually use the asterisk as a element separator, N/L as the segment terminator and a colon(:) as a sub-element separator.

The segment in an actual transmission would appear as:

IT11*CA*1.08**CT*141151 N/L**

In the ASC X12 code list "CA" is the unit of measure code for case, and "CT" is the product identification qualifier for carton.

The following list identifies terms associated with data segments and provides references to codes and terms used in the X12 standard. The actual transmission does not include all of the listed items as only the segment identifier characters, the values for each data element, the data element separators and the segment terminator characters are transmitted.

Segment Identifier, Two or three characters assigned to identify the segment. The identifier occupies the first character positions of the segment.

Data Element Reference Number, A number assigned to the data element to provide a reference to the ASC X12 Data Dictionary which defines specifications for each data element.

Data Element Reference Designator, A structured code assigned to each data element in a segment to indicate its unique position in the segment. It is composed of the segment identifier and its sequential position within the segment.

Data Element Name, This is the name assigned to the data element in the ASC X12 Data Dictionary.

Attributes, Each data element has three ASC X12 attributes: element usage or Condition Designator, data element type, and Minimum/Maximum length.

Condition Designator**M** - Mandatory

The element is required to appear in the segment.

O - Optional

Appearance of the data element is at the option of the sending party or is based on the mutual agreement of the trading partners.

X - Relational

Condition that may exist between two or more data elements based on the presence or absence of one of the data elements. Additional codes are used to identify the condition i.e. P - Paired or Multiple, R - Required, E - Exclusion, C - Conditional, or L - list Conditional. Refer to the X12 Standards Manual, Introduction to X12.22 Segment Directory.

Data Element Type**ID** Identifier

The data element must always contain a value from a predefined list of values that is maintained by X12 or by other bodies that are recognized by X12 and identified by reference in Appendix A in the Data Element Dictionary. The value is left justified. Trailing spaces should be suppressed.

AN String

Alpha-numeric sequence of characters containing at least one non-space character. The significant characters must be left justified. Leading spaces, if used are assumed to be significant characters. Trailing spaces should be suppressed.

FS Fixed Length String

A sequence of any letters, spaces, and/or special characters with spaces filled, if necessary, to satisfy minimum length.

DT Date

The format is YYMMDD where YY is the Year, MM is the month and DD is the day of the month.

TM Time

Values for a time-type data element are in the HHMMSSd.d format expressed using the 24-hour clock. HH expresses the hour(00-23), MM expresses the minute(00-59), SS the seconds(00-59), and d.d is the numeric expression of decimal seconds.

Nn Numeric

Numeric data element where N indicates a numeric and "n" indicates the decimal places to the right of a fixed, implied decimal point. The decimal point is not transmitted in the character stream. If the max length of the data element was five position and the Type was N2, the values sent would always have two decimal positions; an N0 would contain no decimal positions.

R Decimal

A numeric data element where the decimal point is optional for integer values, but required for fractional values. Leading zeros should be suppressed unless necessary to satisfy a minimum length requirement. The decimal point and the minus sign when transmitted are not counted when determining the length of the data element value. If the max length of the data element was three positions, the following represent the values that could be sent: NNN, .NNN, N.NN, NN.N, -N.NN, etc.

B Binary

Any sequence of octets ranging in value from binary 00000000 to binary 11111111. Binary may only exist in the BIN Segment.

Minimum/Maximum, This is the range, minimum to maximum, of the number of character positions available to represent the data element value. It may be of variable length with a minimum to maximum, or it may be of fixed length in which the minimum is equal to the maximum.

10.2 X12 EDI Transmission Control Structure

The X12 Transmission is a hierarchical structure of headers and trailers to allow transaction sets of different types to be transmitted in the same transmission and allows the data to be separated or segregated logically for easy interpretation and internal routing by the receiver.

Transaction sets begin with an ST segment and end with an SE segment. Multiple transaction sets of the same functional group are transmitted together beginning such a group with a GS (Group Start) and ending with a GE (Group End) segment. One or more functional groups are bound together for transmission within an interchange envelope that starts with an ISA segment and ends with an IEA segment. There are other segments available for Security and Interconnect control when using the services of third party communications providers (VANS).

The *interchange control structure* is the interchange envelope consisting of a Header (ISA) and a Trailer (IEA) for the electronic interchange through a data transmission, and provides a structure to acknowledge the receipt and processing of the envelope.

The ISA and the IEA envelope one or more functional groups or interchange-related control segments and perform the following functions:

- C Define the segment terminator, and the element and sub-element separators.
- C Identify the sender and receiver,
- C Provide control information for the interchange, and
- C Allow for authorization and security information.

The X12 standard also provides an interchange acknowledgment segment to be used to acknowledge a transmission's Header and Trailer. It may be used to report the success of the syntactical analysis of the ISA/IEA. This is not the Functional Acknowledgment.

The GS and GE envelope transactions sets of the same type. Each type of transaction is contained in a separate Functional Group to allow the receiver to parse the information to the appropriate application. The GS segment provides the identity of the Version and Release of the standard used to create the transaction. Both the GS and the GE provide control information to ensure the validity of the interchange.

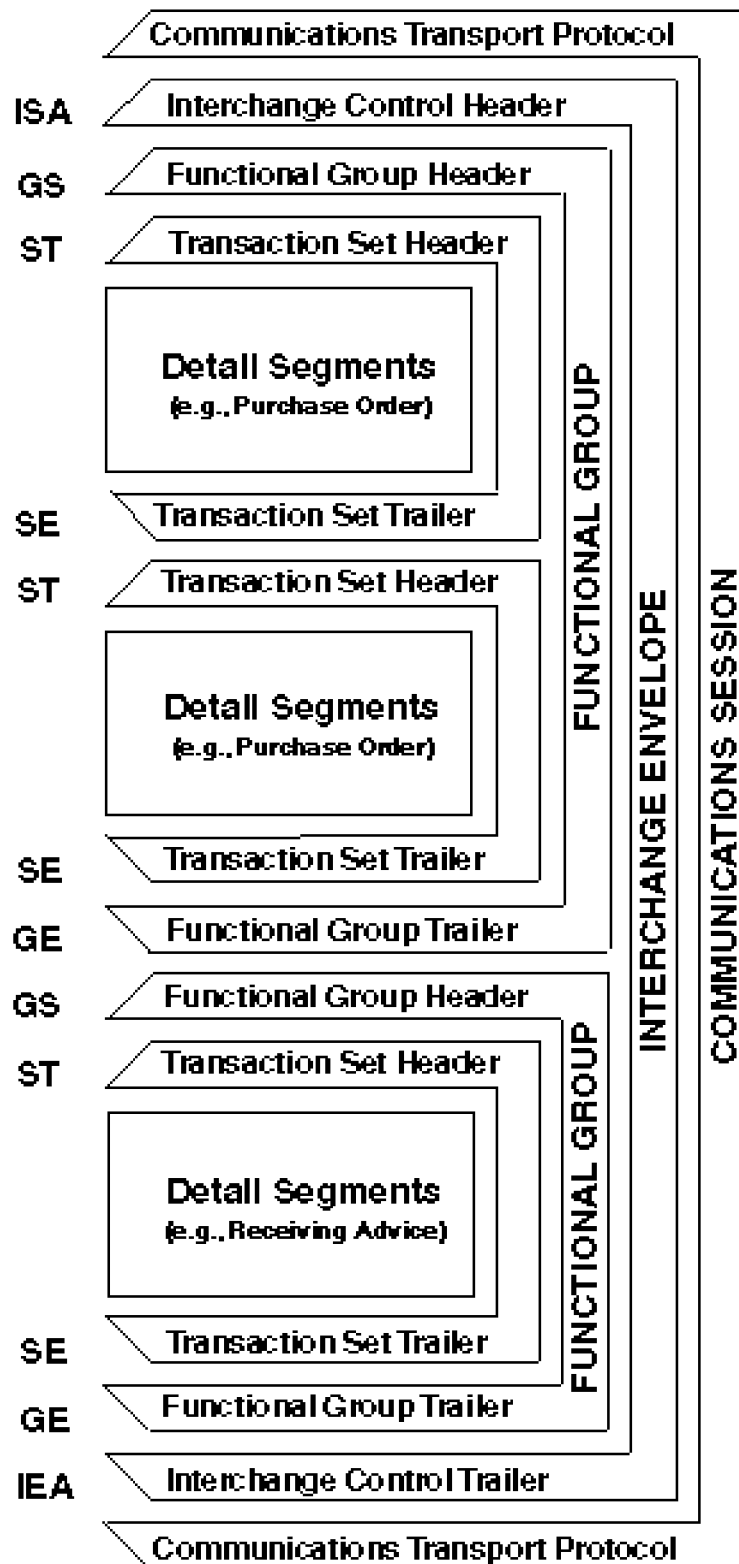
Every transaction set begins with an ST (Transaction Start) segment and is ended with a GE (Group End) segment.

Translators normally strip off the ISA/IEA and GS/GE segments during translation. It is the responsibility of the trading partners to make provisions to archive the transmissions before and after translation to satisfy EDI Audit Requirements.

The structures of the transaction set and functional group headers and trailers are found in the Segment Directory. The structures of the interchange control header and trailer are found in the Interchange Control Structure Standard (dpANS X12.5-1989).

See the following EDI Transmission schematic. The schematic illustrates a typical format for electronically transmitting a series of diverse business transactions.

Schematic of an EDI Transmission



EDI Transmission Structure

10.2.1 Control Segments

Segment: **ISA Interchange Control Header**

Purpose: To start and identify an interchange of one or more functional groups and interchange-related control segments.

Notes: The actual value of the data element separator, the sub-element separator, and the segment terminator for all the segments following this ISA (that starts this communication) thru the IEA (that completes the transmission) are established in the ISA. Byte 4, following the three bytes that comprise the ISA (the identification of this header) will be used to separate the remaining elements in this and all succeeding data elements thru the end of the IEA. This implementation guide will use the asterisk (*) as the graphic representation of the data element separator. The sub-element separator is established in data element I15. It also will be the sub-element separator thru the end of the IEA. This implementation guideline will use the colon (:) as the graphic representation of the sub-element separator. The value at the last position of the ISA establishes the segment terminator for the communication thru the end of the IEA. The ISA consists of fixed length fields, therefore the segment terminator will be the 106 byte or the first byte after data element ISA16.

The control characters selected as the segment separator, sub-element separators and the segment terminators must be characters that will not be data characters within the communication. Acceptable characters, in hexadecimal notation are HEX 04, HEX 0D, HEX 4F, HEX 1C, or HEX 15. Refer to the individual EPA implementation guidelines for the appropriate control characters.

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
ISA01	I01	Authorization Information Qualifier	M, ID, 2/2
		Code to identify the type of information in the Authorization information. 00 No Authorization Information Present (No meaningful information in I02) 03 Application Routing Reference	
ISA02	I02	Authorization Information	M, AN, 10/10
		Information used for additional identification or authorization of the of the sender or the data in the interchange. The type of information is set by the Authorization Information Qualifier.	

EPA EDI IMPLEMENTATION GUIDELINE

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
ISA03	I03	Security Information Qualifier	M, ID, 2/2
		Code to identify the type of information in the Security Information	
		00 No Security Information Present (No Meaningful Information in I04)	
		01 Password	
ISA04	I04	Security Information	M, AN, 10/10
		This is used for identifying the security information about the sender or the data in the interchange. The type of information is set by the Security Information Qualifier.	
ISA05	I05	Interchange ID Qualifier	M, ID, 2/2
		Qualifier to designate the system/method of code structure used to designate the sender or receiver ID element being qualified.	
		01 Duns (Dun & Bradstreet)	
		09 X.121 (CCITT)	
		14 Duns Plus Suffix	
ISA06	I06	Interchange Sender ID	M, ID, 15/15
		Identification code published by the sender for other parties to use as the receiver ID to route data to them. The sender always codes this number in the sender ID element.	
ISA07	I05	Interchange ID Qualifier	M, ID, 2/2
		Qualifier to designate the system/method of code structure used to designate the sender or receiver ID element being qualified.	
		01 Duns (Dun & Bradstreet)	
		09 X.121 (CCITT)	
		14 Duns Plus Suffix	
ISA08	I07	Interchange Receiver ID	M, ID, 15/15
		Identification code published by the receiver of the data. When sending, it is used by the sender as their sending ID, thus other parties sending to them will use this as a receiving ID to route data to them.	

EPA EDI IMPLEMENTATION GUIDELINE

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
ISA09	I08	Interchange Date Date of the interchange.	M, DT, 6/6
ISA10	I09	Interchange Time Time of the interchange.	M, TM, 4/4
ISA11	I10	Interchange Control Standards Identifier Code to identify the agency responsible for the control standard used by the message that is enclosed by the interchange header and trailer. U U.S. EDI Community of ASC X12, TDCC, and UCS	M, ID, 1/1
ISA12	I11	Interchange Control Version Number This version number establishes the interchange control segment version and release. Refer to the individual EPA implementation guidelines for the appropriate information. It does not establish the Version/Release for the transactions which follow. That Version/Release is established by the GS (Functional Group Header) preceding the transactions. 00302 Draft Standard for Trial Use Approved for Publication by ASC X12 Procedures Review Board Through October 1991 00303 Draft Standard for Trial Use Approved for Publication by ASC X12 Procedures Review Board Through October 1992 00304 Draft Standard for Trial Use Approved for Publication by ASC X12 Procedures Review Board Through October 1993	M, ID, 5/5
ISA13	I12	Interchange Control Number This number uniquely identifies the interchange data to the sender. It is assigned by the sender. Together with the sender ID it uniquely identifies the interchange data to the receiver. It is suggested that the sender, receiver, and all third parties be able to maintain an audit trail or interchanges using this number. The number is suggested to start with 000000001 and be incremented by 1 for each subsequent ISA between the sender and receiver. It must match the number in IEA02.	M, NO, 9/9

EPA EDI IMPLEMENTATION GUIDELINE

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
ISA14	I13	Acknowledgment Requested Code sent by the sender to request an interchange acknowledgment. Refer to the individual EPA project guidelines. 0 No Acknowledgment Requested 1 Acknowledgement Requested	M, ID, 1/1
ISA15	I14	Test Indicator Code to indicate whether data enclosed by this interchange envelope is test or production. P Production Data T Test Data	M, ID, 1/1
ISA16	I15	Sub-element Separator	M, AN, 1/1

Note: ISA16 is followed by a character that will establish the segment terminator for the balance of the communication, thru the end of the IEA. Refer to the Notes at the start of this segment.

Segment: **IEA Interchange Control Trailer****Purpose:** To define the end of an interchange of one or more functional groups and interchange-related control segments.

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
IEA01	I16	Number of Included Functional Groups	M, N0, 1/5
		A count of the number of functional groups included in a transmission.	
IEA02	I12	Interchange Control Number	M, N0, 9/9
		This number uniquely identifies the interchange data to the sender. It is assigned by the sender. Together with the sender ID it uniquely identifies the interchange data to the receiver. It is suggested that the sender, receiver, and all third parties be able to maintain an audit trail of interchanges using this number. This number must agree with the number is ISA12.	

Segment: GS Functional Group Header

Purpose: To indicate the beginning of a functional group and to provide control information.

Syntax: 1 The data interchange control number (GS06) in this header must be identical to the same data element in the associated Functional Group Trailer (GE02).

Comments: A A functional group of related transaction sets, within the scope of X12 standards, consists of a collection of similar transaction sets enclosed by a functional group header and a functional group trailer.

Notes: The GS establishes the Version/Release for the transaction sets between it and the GE (Group End).

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
GS01	479	Functional Identifier Code	M, ID, 2/2
		Code identifying a group of application related Transaction Sets. Listed below are examples. Refer to the individual EPA implementation guidelines for the appropriate codes.	
		FA Functional Acknowledgement (997)	
		IN Invoice Information (810, 819)	
		PC Purchase Order Change (860)	
		PO Purchase Order Transaction (850)	
		PR Purchase Order Acknowledgment (855)	
		PS Planning Schedule with Release Capability (830)	
		RT Report of Test Results (863)	
GS02	142	Application Sender's Code	M, AN, 2/15
		Code identifying party sending transmission. Codes agreed to by trading partners.	
GS03	124	Application Receiver's Code	M, AN, 2/15
		Code identifying party receiving transmission. Codes agreed to by trading partners.	
GS04	29	Group Date	M, DT, 6/6
		Date sender generated a functional group of transaction sets.	

EPA EDI IMPLEMENTATION GUIDELINE

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
GS05	30	Group Time	M, TM, 4/4
		Time (HHMM) when the sender generated a functional group of transaction sets (local time at sender's location).	
GS06	28	Group Control Number.	M, N0, 1/9
		Start with 000000001 and increment by 0000000001 for each subsequent GS in the communication.	
		Assigned number originated and maintained by the sender.	
GS07	455	Responsible Agency Code	M, ID, 1/2
		Code used in conjunction with Data Element 480 to identify the issuer of the standard.	
		X Accredited Standards Committee X12	
GS08	480	Version/Release/Industry ID Code	M, ID, 1/12
		Code indicating the version, release, sub-release and industry (Agency) identifier of the EDI standard being used. Positions 1-3, version number; positions 4-6, release and sub-release level of version; positions 7-12, industry, Agency or trade association identifier (optionally assigned by user).	
		Refer to the individual EPA implementation Guidelines for the appropriate code.	

Segment: GE Functional Group Trailer**Purpose:** To indicate the end of a functional group and to provide control information.**Syntax:** 1 The data interchange control number (GE02) in this trailer must be identical to the same data element in the associated Functional Group Header (GS06).**Comments:** A The use of identical data interchange control number in the associated functional group header and trailer is designed to maximize functional group integrity. The control number is the same as that used in the corresponding header.

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
GE01	97	Number of Transaction Sets Included Total number of transaction sets included in the functional group or interchange (transmission) group terminated by the trailer containing this data element.	M, N0, 1/6
GE02	28	Group Control Number Assigned number originated and maintained by the sender. It must be identical to the number in the Group Header(GS).	M, N0, 1/9

Segment: ST Transaction Set Header**Purpose:** To indicate the start of a transaction set and to assign a control number**Comments:** The transaction set identifier (ST01) is intended for use by the translation routines of the interchange partners to select the appropriate transaction set definition (e.g., 810 selects the invoice transaction set).

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
ST01	143	Transaction Set Identifier Code.	M, ID, 3/3
		Refer to the individual EPA implementation guidelines for the appropriate codes.	
		Code uniquely identifying a transaction set.	
		810	X12.2 Invoice
		820	X12.4 Remittance/Payment Advice
		830	X12.14 Planning Schedule
		848	X12.36 Material Safety Data Sheet
		850	X12.1 Purchase Order
		855	X12.9 Purchase Order Acknowledgment
		860	X12.15 Purchase Order Change
		863	X12.41 Report of Test Results
		865	X12.16 Purchase Order Change
Acknowledgment		997	X12.20 Functional Acknowledgment
ST02	329	Transaction Set Control Number	M, AN, 4/9
		Identifying control number assigned by the originator for a transaction set.	
		A number to uniquely identify transaction set sequence within a functional group. Start with 0001 for the first transaction set and increment by 001 for each transaction set within a functional group. This value must agree with the value in SE02.	

Segment: **SE** Transaction Set Trailer

Purpose: To indicate the end of the transaction set and provide the count of the transmitted segments (including the beginning (ST) and ending (SE) segments).

Comments: SE is the last segment of each transaction set.

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
SE01	96	Number of Included Segments	M, N0, 1/6
		Total number of segments included in a transaction set including ST and SE segments.	
SE02	329	Transaction Set Control Number	M, AN, 4/9
		Identifying control number assigned by the originator for a transaction set.	